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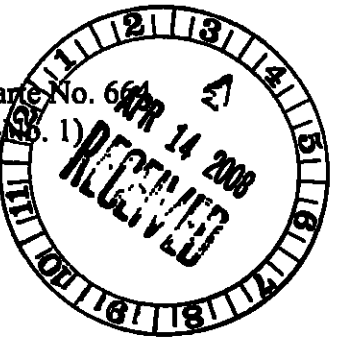
BEFORE THE
SURFACE TRANSPORTATION BOARD

USE OF A MULTI-STAGE DISCOUNTED CASH FLOW MODEL IN DETERMINING THE RAILROAD INDUSTRY'S COST OF CAPITAL	)	Ex Parte No. 664 (Sub-No. 1)



COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

George P. Aspatore
Paul A. Guthrie
Paul R. Hitchcock
Theodore K. Kalick
David C. Reeves
Louise Anne Rinn
John M. Scheib
Peter J. Shudtz
Richard E. Weicher

G. Paul Moates
David M. Levy
Richard E. Young
SIDLEY AUSTIN LLP
1501 K Street, N.W.
Washington, D.C. 20005
(202) 736-8000

Samuel S. Sipe
Anthony LaRocca
STEPTOE & JOHNSON LLP
1330 Connecticut Ave., N.W.
Washington, D.C. 20036
(202) 429-6486

Louis P. Warchot
ASSOCIATION OF AMERICAN RAILROADS
50 F Street, N.W.
Washington, D.C. 20001
(202) 639-2502

Counsel for the Association of American Railroads and Member Railroads

April 14, 2008

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COMMENTS OF THE
ASSOCIATION OF AMERICAN RAILROADS

Pursuant to the schedule established by the Board's Advance Notice of Proposed Rulemaking ("ANPR") served February 11, 2008, the Association of American Railroads ("AAR") and its members respectfully submit these Comments in the above-captioned proceeding. In support of these Comments, AAR also submits the verified Statement of Dr. Bruce E. Stangle, Chairman, Analysis Group, Inc. ("Stangle V.S.").

INTRODUCTION AND SUMMARY

The AAR agrees with the suggestion in the ANPR that the use of a multi-stage Discounted Cash Flow ("DCF") model with appropriate inputs would "enhance the precision of the resulting cost-of-equity estimate," and, therefore, the reliability of the Board's determination of the cost of capital. ANPR at 4. Although the Capital Asset Pricing Model ("CAPM") recently adopted by the Board in Ex Parte No. 664 may prove to be a reliable tool for measuring the cost of equity, basing the cost of equity estimates on the results of both the CAPM *and* a properly defined DCF model should produce results that are more reliable and less volatile than the results that are calculated using only the CAPM.

Thus, in response to the Board's request for "comments on an appropriate multi-stage DCF for use in the Board's cost-of-equity determination" (*id.*), the AAR is proposing

herein a version of the Morningstar/Ibbotson multi-stage DCF – a model which the Board has generally viewed with favor. The Morningstar/Ibbotson model has already been recognized as a reliable method of calculating the cost of equity, and is used by investors to make real-world investment decisions, rather than as a litigation or advocacy tool.

Equally important, the Morningstar/Ibbotson model proposed herein meets all four of the criteria that the ANPR described for a proper multi-stage DCF, and satisfies the concerns that the Board has expressed regarding prior versions of that model. Specifically:

- The Morningstar/Ibbotson model is a true multi-stage DCF. The model uses more than one stage, and more than one growth rate.
- The Morningstar/Ibbotson model does not focus exclusively on dividends. Instead, the model uses a broader measure of cash flow.
- The Morningstar/Ibbotson model can be modified to include only those railroads that pass the screening criteria set forth in *Railroad Cost of Capital – 1984*, 1 I.C.C.2d 989 (1985) – *i e* , Burlington Northern Santa Fe ("BNSF"), CSX Transportation, Inc. ("CSXT"), Norfolk Southern ("NS"), and Union Pacific ("UP")
- The Morningstar/Ibbotson model, when used in combination with the CAPM, would enhance the precision of the Board's calculation of the cost of equity. As Dr. Stangle demonstrates in the attached verified statement, when used together, the two models produce more precise and less volatile estimates (*i.e.*, lower standard deviations) over time than either model alone.

For these reasons, the AAR recommends that the Board (1) issue a formal notice of proposed rulemaking inviting comments on an appropriately constructed multistage DCF model for use in conjunction with the CAPM methodology for making the annual cost of capital determinations, and (2) propose the adoption of the Ibbotson/Morningstar model discussed herein for use in the Board's cost of capital determinations.

ARGUMENT

I. DETERMINING THE RAILROADS' COST OF EQUITY BY AVERAGING THE RESULTS OF THE CAPM METHODOLOGY ADOPTED BY THE BOARD IN EX PARTE NO. 664 WITH A METHODOLOGICALLY SOUND MULTI-STAGE DCF MODEL WOULD PRODUCE MORE STABLE AND RELIABLE RESULTS THAN THE CAPM VALUE ALONE.

In its final decision in Ex Parte No 664, the Board found that both the CAPM and the DCF models "seek to estimate the true cost of equity for a firm, and if applied correctly, should produce the same expected result," and that using both approaches therefore is likely to result in "a more reliable, less volatile, and ultimately superior estimate than by relying on either model standing alone." *See* Ex Parte No. 664, *Methodology To Be Employed In Determining the Railroad Industry's Cost of Capital*, Decision released January 17, 2008 ("January 17 Decision"), at 13. The Board is correct on both points.

All cost of equity models are imperfect estimates of reality. As the Board has stated, "Because the cost of equity cannot be directly observed, estimating the cost of equity requires adopting a finance model and making a variety of simplifying assumptions." January 17 Decision at 3.

When multiple independent and valid estimation methods are available, using multiple methods is likely to improve the reliability and stability of the result Hence, it is likely that a cost of equity estimate based on both the CAPM and DCF models will be better than an estimate based on CAPM alone.

As the Board stated in its January 17 Decision, "academic studies ha[ve] demonstrated that using multiple models will improve estimation techniques when each model provides new information." January 17 Decision at 13 n.42 (quoting Federal Reserve Board

testimony and citing several publications by economic experts). For example, one such study concluded:

> [I]nstead of choosing a single forecasting method, it seems reasonable to consider aggregating information by generating forecasts from several methods and then combining these forecasts. In this manner, the ultimate forecasts should contain more information than the case when only a single method is used. This could provide more accurate forecasts and improved decisions based on these forecasts.[1]

Both the railroads and the Western Coal Traffic League ("WCTL"), and their economic experts, have recognized this fact as well. The AAR repeatedly urged the Board to consider the results of all reasonable methods of calculating the cost of capital. *See, e.g.,* AAR Comments filed September 27, 2007, in Ex Parte No 664 ("AAR XP 664 Comments" at 13-14, AAR Reply Comments filed October 29, 2007, in Ex Parte No. 664 ("AAR XP 664 Reply Comments") at 21-22. That view was supported by the economists who testified for the AAR [2]

The WCTL also agreed in the Ex Parte No. 664 proceeding that using two or more reliable models would enhance the accuracy of a regulator's estimate of the cost of equity. For example, the WCTL stated that "the STB should not blindly follow any single model to determine the COE," and that a "multiple-stage DCF model, properly applied, has considerable

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[1] Makridakis, S. and Winkler, R. L., "Average of Forecasts: Some Empirical Results," *Management Science*, Vol. 29, No. 9, September 1983, pp 987-996.

[2] *See* AAR XP 664 Comments, Verified Statement of R. Glenn Hubbard and Bruce E. Stangle, at 4 ("it would be valuable for the STB to use a multi-stage DCF model as a cross check on the distribution of results obtained from the CAPM"), *id.*, Verified Statement of Stewart C Myers at 8 ("Given the CAPM's imprecision and imperfections, the Board should not rely on it exclusively It should not ignore evidence from other sources, including DCF models"); AAR XP 664 Reply Comments, Reply Verified Statement of Stewart C. Myers, at 3, 9 (Board should "also use DCF estimates, at least as a check on the CAPM" and "should not ignore other approaches to estimating the cost of equity," including DCF estimates), *id.*, Reply Statement of R Glenn Hubbard and Bruce E. Stangle, at 10 (CAPM and DCF models "can provide a meaningful check on the reasonableness of any results obtained")

potential to serve as a check on the reasonableness of application of the CAPM approach."[3] Similarly, WCTL's witness James Hodder, an economist offered as an expert on cost of capital methodologies, endorsed the use of a multi-stage DCF model in conjunction with the CAPM:

> As I have indicated on several occasions, the benefit of obtaining estimates from both the CAPM (or a similar model) and from a multiphase DCF model is that they use different approaches to very different types of inputs. However, they should yield similar cost of equity estimates if the input assumptions are consistent with each other. Both types of models have significant implementation issues One is not better than the other, but rather they are different In the current circumstances, different perspectives can be helpful.[4]

The parties' views are consistent with current practices of regulators. Numerous state regulatory commissions have agreed that a regulator should use two or more cost of equity models, at least as a check on each other.[5] As one state regulatory body has stated, "This

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[3] Reply Comments of WCTL filed October 29, 2007, in Ex Parte No. 664, at 19. *See also id* at 3; Written Hearing Testimony of WCTL filed November 27, 2007, in Ex Parte No. 664, at 15 ("A multi-stage DCF model is particularly useful as a check on the CAPM results").

[4] *See* Reply Verified Statement of James E. Hodder filed October 29, 2007, in Ex Parte No. 664, at 3, 12. *See also* Transcript of February 15, 2007, Hearing in Ex Parte No. 664, at 95 (testimony of James E. Hodder) ("I would suggest you mandate a multi-phase DCF model"); *id* at 96 ("I would suggest that you mandate a second estimation methodology based on some asset pricing model," including either CAPM, Fama-French, or arbitrage pricing theory. "The basic idea here is that all three of these models are similar in the sense that they focus on first, a risk-free return, which includes both a real return and an inflation adjustment. .. [I]n the end, you should get out similar estimates"); *id* at 97 ("The models are estimating [the cost of equity] imperfectly. But they should converge"); *id.* at 98 ("if the inputs used across the various models are consistent with each other, [the] difference [in the cost of capital estimates] should be modest").

[5] *See, e g , Arizona Public Service Co.*, 258 P U R.4th 353, 390-391 (ACC 2007) (DCF model "has long been favored by this and other Commissions as the appropriate way to estimate a regulated utility's cost of equity," but "we compare those results with the results from the other methods, and believe that the DCF results alone would not result in an appropriate cost of equity in this case for APS"); *Pennsylvania Public Utility Commission v City of Lancaster*, 100 Pa. PUC 175, 2005 WL 2203829, at p. 83 (2005) (although "we have primarily relied upon the DCF methodology .. , we conclude that methods other than the DCF, such as the CAPM and RP methods can be used as a check upon the reasonableness of the DCF derived equity return calculation"); *Pacific Gas and Electric Co* , 238 P.U.R.4th 206, 223 (Cal. PUC 2004) ("We continued to rely on the CAPM, DCF, and MRP as a basis for determining a fair and reasonable ROE"); *Consumers Maine Water Company – Millinocket*, 204 P.U.R.4th 316, 334 (Me. PUC 2000) ("we will use (as we have in the past) the Bench Analysis CAPM as a check on our DCF

Commission advocates the use of multiple models to estimate a utility's cost [of] equity. No single cost of equity model is so reliable that it should be used to the exclusion of all other models."[6]

II. THE BOARD SHOULD ADOPT A MULTI-STAGE DCF MODEL BASED ON THE MORNINGSTAR/IBBOTSON MODEL.

Of course, averaging the estimates produced by the CAPM with the results of a multi-stage DCF model is unlikely to improve the reliability of the Board's cost-of-equity estimates unless the DCF model uses a sound methodology and reliable inputs. *See* ANPR at 4. As we describe in this section, the 3-stage DCF model proposed by the AAR here is clearly sound and reliable.[7]

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analysis"); *Hawaii Electric Light Co*, 178 P U R 4th 82, 110 (Haw. PUC 1997) (using "the average rate indicated in each of the DCF and CAPM ranges"); *Pacific Northwest Bell Telephone Co*, 82 P.U R.4th 293, 340 (Or. PUC 1987) ("The Commissioner's policy has been to use DCF as a check on the reasonableness of CAPM"). *Cf National Fuel Gas Distribution Corp*, 262 P U.R 4th 233 (N.Y.P S C. 2007) (NYPSC uses "two-thirds DCF method and one-third CAPM method weighting" in determining cost of equity); *US West Communications, Inc*, 183 P.U.R.4th 382, 437 (Utah PSC 1997) ("we and most regulatory commissions prefer to rely on the DCF model, and accept CAPM results, if at all, as a reasonableness check on the results of other models"), *Southern New Hampshire Water Co.*, 76 N.H. PUC 521, 533 (N H.P.U.C 1991) ("the record in this case does support the use of the CAPM as a 'reality check'" on DCF results).

[6] *Petition of South Haven Sewer Works, Inc For Approval of a New Schedule of Rates and Charges for Sewage Disposal Service in Rural Areas of Porter County,* Ind. URC Docket No. 41903, 2002 WL 31107491, at p. 8 (2002).

[7] Three-stage DCF models have already been approved and used by regulators in some states. *See, e g, Public Service Co. of New Hampshire,* 90 N.H. P.U.C. 230 (2005), Order No. 24,473, 2005 WL 2230200, at p 29 (N.H.P.U.C. 2005), *AT&T Communications of California, Inc*, CPUC Application Nos. 01-02-035, *et al*, Decision 04-09-063, 2004 WL 2327932, at *75 (Cal. PUC 2004); *Indiana Bell Telephone Co., Inc. d/b/a SBC Indiana*, Ind. URC Cause No. 42393, 2004 WL 513743, at *66 (Ind URC 2004), *Application of Nevada Power Co.*, Nevada PUC Docket No. 01-10002, 2002 WL 32862407, at p. 18 (Nev. PUC 2004) ("The Commission ... still believes that the DCF model, especially the three-stage model, provides the best estimate of the appropriate rate of return").

In its ANPR, the Board described four criteria that it would follow in deciding whether to adopt a multi-stage DCF. First, "and foremost," the DCF model "should be a *multi-stage model*" ANPR at 3 (emphasis in original). Second, the DCF model "should not focus on dividend payments only." *Id* Third, the DCF model "should be limited to those firms that pass the screening criteria that [the then-Interstate Commerce Commission] set forth in *Railroad Cost of Capital – 1984*, 1 I.C.C.2d 989 (1985)." *Id.* Fourth, the Board must be satisfied that any multi-stage DCF model it might adopt "would, when used in combination with the CAPM model, enhance the precision of the resulting cost of equity estimate." *Id.* at 4. The Morningstar/Ibbotson model that the AAR proposes here meets all four of these requirements. Verified Statement of Bruce E. Stangle ("Stangle V.S.") ¶¶ 8-22.

The Board stated in the ANPR that "the general approach of the Morningstar/Ibbotson multi-stage DCF might prove satisfactory" (ANPR at 3), reconfirming its statement in the January 17th decision that "the Morningstar/Ibbotson multi-stage DCF show[s] some promise." January 17 Decision at 14 However, in the ANPR and the January 17 Decision, the Board identified certain concerns that would need to be addressed before it could consider adopting the Morningstar/Ibbotson model. For example, the Board expressed concern that: (1) the model currently includes firms that do not meet the screening criteria in the 1984 *Cost of Capital* decision (ANPR at 3), (2) certain key underlying assumptions of the model had not yet been "explained to [the Board's] satisfaction" (January 17 Decision at 14); and (3) the record in the Ex Parte No. 664 proceeding contained no evidence showing how the model would compare against CAPM, so that the Board could analyze "whether a combination of the two approaches could lead to a more reliable and less volatile cost-of-equity estimate" (ANPR at 3; January 17 Decision at 14).

The Board's tentative support for the Morningstar/Ibbotson model is well-founded. Morningstar/Ibbotson routinely uses a three-stage DCF model to estimate, and publish, estimates of the cost of equity for a wide range of industries, including the railroad industry. Stangle V S. ¶¶ 3, 7, 18. The Morningstar/Ibbotson three-stage DCF is an objective, unbiased tool for calculating the cost of equity, because it is an independent approach that was developed by disinterested, and widely respected, third parties for use by the financial community in evaluating publicly traded equities and in making real-world investment decisions. Thus, the model was not developed to be used as a tool for litigation or advocacy. *Id* ¶¶ 3, 7, 18, 22. Moreover, the model can be estimated from readily available data and can be modified to estimate the cost of equity for a particular group, such as the group of railroads passing the Board's screening criteria *Id.* ¶¶ 3, 7, 11.

As discussed below, the Morningstar/Ibbotson multi-stage DCF model proposed by the AAR here has been modified to meet all of the criteria set forth in the ANPR At the request of the AAR, Dr. Stangle analyzed the model and the published documentation related to its methodology He was able to apply the model using different growth rates for each stage and broader measures of cash flow than dividends, and he modified it to include only the four railroads that pass the screening criteria of the *1984 Cost of Capital* decision – BNSF, CSXT, NS, and UP. *Id* ¶¶ 4-8, 11, 13. Moreover, in response to the Board's concern regarding the lack of evidence comparing the Morningstar/Ibbotson model with the CAPM, Dr. Stangle's verified statement compares the performance of the multi-stage DCF model, as so modified, with that of the CAPM approved by the Board. *Id.* ¶¶ 19-22.[8] Finally, the underlying assumptions of the

[8] Dr. Stangle derived his CAPM estimates by using the methodology that the AAR used to estimate the 2006 railroad cost of capital in Ex Parte No. 558 (Sub-No 10), submitted in February 2008. Stangle V S ¶ 19 n 10. That CAPM is the same CAPM adopted by the Board in its January 2008 decision in Ex Parte No 664.

proposed Morningstar/Ibbotson model are explained in the workpapers attached to Dr Stangle's testimony.

A. The Morningstar/Ibbotson Model is a Multi-Stage DCF.

The proposed modified Morningstar/Ibbotson model is a true multi-stage model. The model uses three stages: Stage 1, which represents the first 5 years; Stage 2, which represents the 6th through 10th years; and Stage 3, which represents all years following the first 10. Stangle V.S. ¶¶ 13-15. Unlike the single-stage DCF model used by the Board in its previous cost of capital proceedings, which used a constant growth rate, the modified Morningstar/Ibbotson model uses three different growth rates:

- In each of the first five years (Stage 1), the growth rate used is the median value of the three- to five-year growth estimates for each of the four railroads (BN, CSXT, NS, and UP) as provided by railroad industry analysts
- During years six through ten, the growth rate is the average of the earnings growth for the four railroads, taken as a whole.
- Beginning in year 11 and thereafter, the growth rate is assumed to be the long-run nominal growth rate of the aggregate U.S. economy

Stangle V S. ¶¶ 13-16. Thus, the Morningstar/Ibbotson model eliminates the possibility that the cost of equity might be overstated due to a constant growth rate. *See* ANPR at 3; Stangle V S. ¶ 15.

B. The Morningstar/Ibbotson Model Discounts All Relevant Projected Cash Flows To Shareholders, Not Simply Dividend Payments.

In the ANPR, the Board stated that the future cash flows valued by a multi-stage DCF model should not be limited to dividend payments, because the value of a firm should be independent of its dividend policy, and companies return profits to shareholders in ways other than increasing dividends. ANPR at 3. Likewise, in its January 17th decision in Ex Parte No. 664, the Board stated that a pure dividend DCF model was unacceptable because it "may

seriously understate the cost of equity by understating the value (to the investor) of holding the stock in question." January 17 Decision at 14 n.43 The Board therefore required that "broader measures of cash flow or shareholder returns should be incorporated." ANPR at 3.

The proposed Morningstar/Ibbotson model meets this requirement and avoids the problems posed by a simple dividend discount model The Morningstar/Ibbotson model incorporates a broad set of potential cash flows for equity investors by applying expectations of earnings growth to the firm's cash flows, not simply the actual dividend payout. Stangle V S ¶¶ 6, 11-12. In short, the Morningstar/Ibbotson approach captures all of the relevant cash flows that investors are likely to anticipate, whether those cash flows take the form of dividends, share repurchases, or reinvestment of earnings to obtain greater cash flows in the future.

The Morningstar/Ibbotson model also appears to address the Board's concern, expressed in the ANPR, that "atypically large capital investment by the railroads could affect the results of a DCF analysis." *See* ANPR at 4 Although the ANPR did not elaborate the point or identify the parties who raised it in Ex Parte No 664 (*id.*), the Board appears to be referring to the testimony of the AAR's witness Stewart Myers at the December 4, 2007, hearing In describing the flaws in the multi-stage DCF model used by the Board in its August 2007 Notice, Professor Myers testified that a multi-stage DCF which assumed constant "heavy capital investment," and thus low payouts of dividends to investors, would understate the returns realized by investors, because any such "heavy investment" would inevitably decrease over time *See* Transcript of December 4, 2007, Hearing in Ex Parte No. 664 (testimony of Stewart C. Myers), at 44-47 ("December 4 Transcript").[9]

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[9] Specifically, Professor Myers testified:

> Second, the model has to deal with this issue of payout to investors which increasingly comes not as cash dividends but as stock repurchases. The standard DCF models we've seen so far just look at dividends and assume that the payout

The proposed Morningstar/Ibbotson model, however, avoids these problems, because it does not focus exclusively on dividends. As a result, the model does not arbitrarily assume that the only cash flows received by investors are dividends, or that the dividend payout ratios will remain constant over time. Stangle V.S. ¶¶ 11, 15. In addition, the model explicitly includes the impact of capital expenditures on firm cash flow and the measure of cash flow changes in the terminal period to account for reduced capital expenditures that would result as growth slows. *Id.* ¶¶ 11, 16-17.

C. The Morningstar/Ibbotson Model Can Be, and Has Been, Modified To Include Only the Firms That Meet the Board's Screening Criteria.

In the ANPR, the Board expressed concern that the Morningstar/Ibbotson model "applies to firms that do not meet our screening criteria." ANPR at 3 However, of the seven railroads previously included in the Morningstar/Ibbotson model, the railroads which do not meet the Board's *1984 Cost of Capital* criteria are the Kansas City Southern ("KCS"), Genesee & Wyoming, and Providence and Worcester. The remaining four railroads – BN, CSXT, NS, and UP – meet the criteria. Each of those four railroads is a Class I carrier that: (1) has rail assets

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> ratio of dividends versus earnings is constant over time. That's not likely to be true
>
> Third, the model has to worry about -- well, I've already hinted at this -- has to worry about changes in the payout ratio over time Let's suppose the growth is driven by capital investment. In a period of heavy capital investment, you get rapid expansion of the assets but also low payout because the money has to be plowed back in order to expand.
>
> But if and as the growth slows down, payout can increase and increased payout adds to the return eventually that the investors get out of the business. If you run a model that assumes that today's relatively low payouts and relatively low dividend yields continue in perpetuity, you're going to understate the return that the investors can get out of the sale.

December 4 Transcript at 46-47 (testimony of Stewart C. Myers)

greater than 50 percent of its total assets; (2) has a debt rating of at least BBB (Standard & Poor's) and Baa (Moody's); (3) is listed on the New York Stock Exchange, and (4) pays dividends throughout the years. *See id* at 3 n.5.

The Morningstar/Ibbotson model can readily be estimated so that it only includes BNSF, CSXT, NS, and UP Stangle V S ¶ 10 As Dr. Stangle's calculations show, excluding the three smaller railroads from the model has a *de minimis* impact on the model's results.

D. The Morningstar/Ibbotson Model, When Used in Combination With the CAPM Model, Would Enhance the Precision of the Board's Calculation of the Cost of Equity.

Finally, when used in combination with the CAPM, the proposed Morningstar/Ibbotson multi-stage model would in fact "enhance the precision of the resulting *cost-of-equity estimate*" and "*result in a lower variance than reliance on the CAPM approach* alone " *See* ANPR at 4; Stangle V.S ¶¶ 19-22 Indeed, the cost of equity calculated under the proposed multi-stage model is similar to that calculated under the CAPM approved by the Board for 2006 and several preceding years Stangle V S ¶ 20 & Exhibit 4.

For the four Class I railroads that pass the Board's screening criteria (BNSF, CSXT, NS, and UP) the multi-stage Morningstar/Ibbotson model produces a cost of equity ranging from 11 6 percent to 14.6 percent for the period from 1998 through 2006 *Id.* ¶ 19 Over the same period, the CAPM methodology yields estimates ranging from 9.7 percent to 12.7 percent. *Id* Averaging the estimates from the two models results in an estimate in the range of 11.1 percent to 13.4 percent. *Id* ¶ 20.

The standard deviation of these estimates – which is a standard statistical measure of dispersion – confirms that averaging the results of the Board-approved CAPM and the proposed multi-stage Morningstar/Ibbotson DCF creates a more stable estimate of the railroads' cost of equity. *Id.* ¶ 21 The standard deviation of the average is only 75 basis points (0.75

percentage points), which is considerably lower than the standard deviation of the CAPM estimates and DCF model estimates taken separately (92 basis points for each). *Id.* Thus, the combination of the two models results in greater precision (*i.e.*, a lower standard deviation) over time than either model alone. *Id.* ¶¶ 6, 21-22.

CONCLUSION

For the foregoing reasons, the AAR recommends that the Board (1) issue a formal notice of proposed rulemaking inviting comments on an appropriately constructed multi-stage DCF model for use in conjunction with the CAPM methodology for making the annual cost of

capital determinations, and (2) propose adoption of the Ibbotson/Morningstar model as explained herein for use in cost of capital determinations.

Respectfully submitted,

George P Aspatore
Paul A. Guthrie
Paul R Hitchcock
Theodore K. Kalick
David C. Reeves
Louise Anne Rinn
John M. Scheib
Peter J Shudtz
Richard E Weicher

G. Paul Moates
David M. Levy
Richard E Young
SIDLEY AUSTIN LLP
1501 K Street, N.W.
Washington, D C. 20005
(202) 736-8000

Samuel S Sipe
Anthony LaRocca
STEPTOE & JOHNSON LLP
1330 Connecticut Ave., N.W.
Washington, D.C 20036
(202) 429-6486

Louis P. Warchot
Association of American Railroads
50 F Street, N.W.
Washington, D.C. 20001
(202) 639-2502

Counsel for the Association of American Railroads and Member Railroads

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VERIFIED STATEMENT

OF

BRUCE E. STANGLE

CHAIRMAN, ANALYSIS GROUP, INC.

ON BEHALF OF

ASSOCIATION OF AMERICAN RAILROADS

April 14, 2008

I. INTRODUCTION AND SUMMARY

1. My name is Bruce E. Stangle, and I submitted a joint verified statement with Professor R. Glenn Hubbard on behalf of the Association of American Railroads ("AAR") in STB Ex Parte No. 664 on September 27, 2007. We also submitted a joint reply verified statement on October 29, 2007, focusing primarily on the comments of the Western Coal Traffic League ("WCTL"). Professor Hubbard and I submitted written testimony to the Board on November 27, 2007, and I testified before the Board on December 4, 2007. My background and qualifications are described in my September 27, 2007 statement.

2. The Board has invited comments on an appropriate multi-stage Discounted Cash Flow ("DCF") model to complement the Capital Asset Pricing Model ("CAPM") it adopted on January 17, 2008 for determining the railroad industry's cost of equity. I continue to believe there is considerable merit in using both types of models, and I demonstrate in this submission that the Board can obtain its goal of a more stable estimate by using both models.[1]

3. In previous testimony, I urged the Board to rely as much as possible on CAPM model inputs available from widely respected financial data providers such as Morningstar/Ibbotson, Bloomberg, and Value Line. I also pointed out that Morningstar/Ibbotson routinely publishes cost of equity estimates for a wide range of industries, including the railroad industry, using a three-stage DCF model. I continue to believe that the basic approach used in the Morningstar/Ibbotson three-stage DCF model can be a useful complement to the Board's CAPM.

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[1] This view is also in accord with a previous submission of the U S Department of Transportation that stated "We also see real value in the use of a multi-stage DCF methodology in tandem with the CAPM for at least some period." See "Comments of the United States Department of Transportation," In the Matter of Methodology to be Employed in Determining the Railroad Industry's Cost of Capital, STB Ex Parte No. 664, October 29, 2007, p. 11.

4. The Board's February 11, 2008 Advanced Notice of Proposed Rulemaking ("ANPR") invited additional comments on the Morningstar/Ibbotson model, particularly on the issue of whether the model could be adapted to provide estimates for the group of railroads that pass the screening criteria in *Railroad Cost of Capital – 1984*, 1 I.C.C.2d 989 (1985).[2]

5. Since my testimony before the Board on December 4, 2007, I have had the opportunity to study further the three-stage DCF methodology published by Morningstar/Ibbotson, and I illustrate the basic methodology in some detail below.[3] I use the basic methodology to provide annual three-stage DCF estimates for the group of railroads that currently pass the Board's screening criteria (BNSF, CSX, NSC, UP) over the period 1998 to 2007.

6. I also show that when these three-stage DCF model estimates are averaged with the CAPM estimates based on the Board's methodology, a reasonable set of historical estimates are obtained, and these estimates demonstrate more stability (i.e , lower standard deviation) over time than either model alone.

7. The basic Morningstar/Ibbotson three-stage DCF methodology meets the general criteria specified by the Board in its ANPR, and it is an approach that is ultimately relied upon by the many users of the Morningstar/Ibbotson *Cost of Capital Yearbook*, which has been published annually (with quarterly updates) since 1994.[4] In his textbook on the cost of capital, Shannon P Pratt describes the *Cost of Capital Yearbook* as "a comprehensive source of industry-level financial data" that presents "[c]ost of equity, cost of capital, capital structure ratios, growth rates, industry multiples, and other useful financial data" on over 300 industries.[5]

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2 ANPR, p. 3 ("Thus, while the general approach used in the Morningstar/Ibbotson multi-stage DCF model might prove satisfactory, we cannot consider the model as it applies to firms that do not meet our screening criteria").

3 *Cost of Capital Yearbook*, 2007, Morningstar, Inc , p. 24

4 The volume was originally published under the title *Cost of Capital Quarterly*

5 Shannon P Pratt, *Cost of Capital, Estimation and Applications*, 2nd ed , Wiley, 2002, p 128

II. THE MORNINGSTAR/IBBOTSON THREE-STAGE DCF MODEL

8. The Morningstar/Ibbotson three-stage DCF model generally satisfies the Board's criteria for adopting a multi-stage DCF model in that it (a) utilizes more than one growth rate; (b) does not focus exclusively on dividends, but instead incorporates broader measures of cash flow; (c) can be readily estimated for the group of railroads passing the Board's screening criteria; and (d) enhances the stability over time of the resulting cost of equity estimate when it is combined with result from the CAPM.

9. Fundamentally, the cost of equity in the DCF model is the discount rate that equates a firm's market value to the present value of the stream of cash flows that potentially affect equity investors. The DCF model does not assume these cash flows are actually paid to equity investors, but rather that investors will ultimately benefit from these flows through higher regular dividends, special dividends, stock buybacks, or stock price appreciation [6]

10. I use the three-stage DCF model to estimate the annual cost of equity for each of the four railroads over the period 1998 to 2007, and then calculate a market value weighted average of the individual firm estimates to obtain the cost of equity for the railroad industry composite.[7] The calculation of the cost of equity for a single railroad in a specific year (e.g., BNSF in 2006) is illustrated below. The essential building blocks of the model are cash flows and the expected growth of earnings.

11. **Cash flows.** Morningstar/Ibbotson incorporates a broad set of potential cash flows for equity investors into its multi-stage DCF model by applying expectations of earnings growth to the firm's cash flows, not just the actual dividend payout. The Morningstar/Ibbotson model defines cash flows (CF) as income before extraordinary items (IBEI) minus capital expenditures (CAPEX) plus depreciation (DEP) plus deferred taxes (DT). That is,

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[6] See, generally, Shannon P. Pratt, *Cost of Capital, Estimation and Applications*, 2nd ed., Wiley, 2002, p. 112

[7] Market value data used in this submission are from Thomson Financial.

$$CF - IBEI - CAPEX + DEP + DT \quad (1)$$

For this submission, I obtained these financial data from Standard & Poor's Compustat service.

12. An average cash flow figure is used as the starting point of the analysis. For example, the 2006 BNSF average cash flow is computed by first summing the cash flows and sales for the five-year period 2002-2006. Total cash flows for this period are then divided by total sales to determine the 5-year cash flow-to-sales ratio. This ratio is then multiplied by 2006 sales to obtain an average 2006 cash flow estimate. This calculation is shown in Exhibit 1.

Exhibit 1
Average Cash Flow Calculation for BNSF in 2006

	2002	2003	2004	2005	2006	Total
CF ($ m)	$765	$421	$513	$1,073	$1,317	$4,089
Sales ($ m)	$8,979	$9,413	$10,946	$12,987	$14,985	$57,310
				Ratio of CF to Sales [$4,089/$57,310] =		0.07135
				Average Cash Flow in 2006 [0.07135 x $14,985] =		$1,069

Source Stanglc workpapers, April 14, 2008

13. **Growth stages.** The three-stage DCF model is fundamentally a forward-looking model, and the first stage applies to a period that is one to five years in the future (the current year is considered to be year 0). In each year of the first stage, a firm's annual earnings growth rate is assumed to be the median value of the firm's three- to five-year growth estimates of railroad industry analysts.[8] These analyst estimates are reported to I/B/E/S International, and the median

[8] The analyst estimates used in the first stage are referred to by I/B/E/S as the "Long Term Growth Forecasts." The I/B/E/S Glossary describes the estimates as follows "While different analysts apply different methodologies, the Long Term Growth Forecast generally represents an expected annual increase in operating earnings over the company's next full business cycle. In general, these forecasts refer to a period of between three to five years" (Glossary available at http //www rotman utoronto ca/finance/lab/documents/IBES%20Glossary%2020001 pdf)

estimate is subsequently reported by Thomson Financial. Exhibit 2 shows the median earnings growth estimates for the four major railroads in 2006.

Exhibit 2
I/B/E/S Median Growth Rate Estimates

Railroad	2006
BNSF	14.6%
CSX	17.2%
NSC	15 4%
UP	14.0%
Average	15 3%

Source Stangle workpapers, April 14, 2008.

14. The second stage of the model applies to a period six to ten years in the future. In this stage, the cash flows at the end of year five are assumed to grow at the average of the individual firm rates used in stage 1. As shown in Exhibit 2, the average growth rate for 2006 was 15.3 percent.

15. The third stage of the model begins 11 years in the future and continues in perpetuity. Starting in year 11, the firm's growth rate is assumed to be the long-run nominal growth rate of the aggregate U.S. economy The long-run nominal growth rate is estimated using the historical growth in real GDP and the long-run expected inflation rate. For 2006 the long-run growth rate was estimated as 6.0 percent (3.5 percent + 2 5 percent)[9] The third stage growth assumption effectively deals with the primary criticism that was leveled earlier at the Board's single-stage DCF model by the WCTL and others, namely that the single-stage DCF relied on an unrealistically high growth rate in perpetuity.

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[9] The long-run growth rate was estimated using the average annual percentage change in real GDP from 1930 to the specific year under consideration Annual percentage changes in real GDP are available from the Bureau of Economic Analysis of the U.S Department of Commerce at http //www bea.gov/national/index.htm#gdp The long-term inflation forecast for any given year is the median ten-year-ahead inflation forecast from the Survey of Professional Forecasters conducted by the Federal Reserve Bank of Philadelphia, and the results of the survey are available at http://www philadelphiafed org/econ/spf/

16. The third-stage growth rate is applied to a cash flow value that is based on two additional assumptions about the long-run: (i) depreciation equals capital expenditures; and (ii) deferred taxes are zero. That is, cash flow in the third stage of the model is based only on income before extraordinary items (IBEI), whereas in stages 1 and 2 it is based on the expression in equation (1) above. The initial value of IBEI is determined by the same process that was illustrated in Exhibit 1 for cash flows.

17. Equation (A1) of the Appendix gives the mathematical formula that is used to generate the three-stage DCF cost of equity estimates in this submission. The left side of this equation is the market value of the firm. The right side of the equation is the discounted value of the cash flows from the three stages of the firm's expected future growth. The numerator of the final term in equation (A1) [specifically, $IBEI_{10}(1+g_3)/(r-g_3)$] is often referred to as the terminal value of the model because it represents the value in year 10 of the perpetual stream of cash flows that begins in year 11. Equation (A1) in the Appendix is solved for the cost of equity (r) using a relatively simple numerical tool, Microsoft Excel's Solver function. For BNSF in 2006, the solution to this equation is 14.9 percent. I calculate the three-stage DCF cost of equity for the railroad industry composite as the market value weighted average cost of equity for the four major railroads (see equation (A2) of the Appendix). The 2006 three-stage DCF cost of equity estimate for the railroad industry composite is 14.6 percent.

18. I believe the basic methodology underlying the Morningstar/Ibbotson three-stage DCF model is an objective way for the Board to incorporate information from DCF models into its decision making process. While in theory it may be possible to build a model that is more tailored to the specifics of the railroad industry, such a model would necessarily depend on inputs constructed by industry participants with a stake in the eventual outcome, and so I believe it would be difficult for the Board to reach consensus on the structure of such a model. In contrast, the Morningstar/Ibbotson approach has been consistently applied to many different industries and the results have been widely

disseminated for many years to the financial community through the annual *Cost of Capital Yearbook*

III. COMPARISON OF THE CAPM AND THREE-STAGE DCF ESTIMATES

19. Cost of equity estimates produced by the three-stage DCF and CAPM for the set of railroads that pass the Board's screening criteria (BNSF, CSX, NSC, UP) are shown in Exhibit 3 for the years 1998 to 2007. The three-stage DCF estimates were calculated using the basic Morningstar/Ibbotson methodology described in the previous section and range from 11.6 percent to 14.6 percent over this ten year period. The CAPM estimates were calculated using the Board's recently established methodology and result in cost of equity estimates ranging from 9.7 percent to 12.7 percent.[10] The three-stage DCF estimates presented here are similar to the railroad industry composite estimates published annually in the Morningstar/Ibbotson *Cost of Capital Yearbook.*

Exhibit 3
3-Stage DCF and CAPM Cost of Equity Estimates

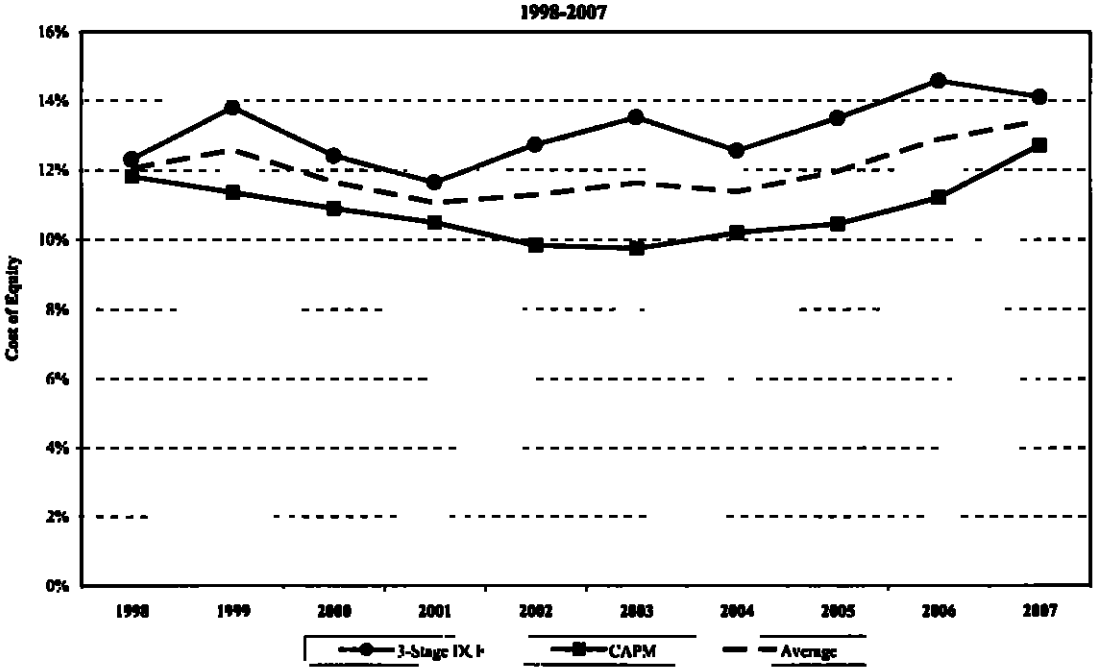
Year	3-Stage DCF	CAPM	Average
1998	12.3%	11.8%	12.1%
1999	13.8%	11.3%	12.6%
2000	12.4%	10.9%	11.7%
2001	11.6%	10.5%	11.1%
2002	12.7%	9.8%	11.3%
2003	13.5%	9 7%	11.6%
2004	12.5%	10.2%	11.4%
2005	13.5%	10.4%	12.0%
2006	14 6%	11.2%	12.9%
2007	14.1%	12 7%	13.4%
Std Dev	0 92%	0.93%	0.75%

Source Stangle workpapers, April 14, 2008

[10] The CAPM estimates were produced using the same methodology the AAR used for its estimate of the 2006 railroad cost of capital in Ex Parte No 558 (Sub-No 10), submitted February 1, 2008 Historical data used in the CAPM estimates for 1998-2007 were obtained from the Center for Research in Security Prices (CRSP®), Graduate School of Business, The University of Chicago

20. The data in Exhibit 3 are plotted in Exhibit 4. Exhibit 4 clearly shows that averaging the results from the two models leads to a more stable estimate over time. The year-to-year average of the three-stage DCF and CAPM estimates ranges from 11.1 percent to 13.4 percent.

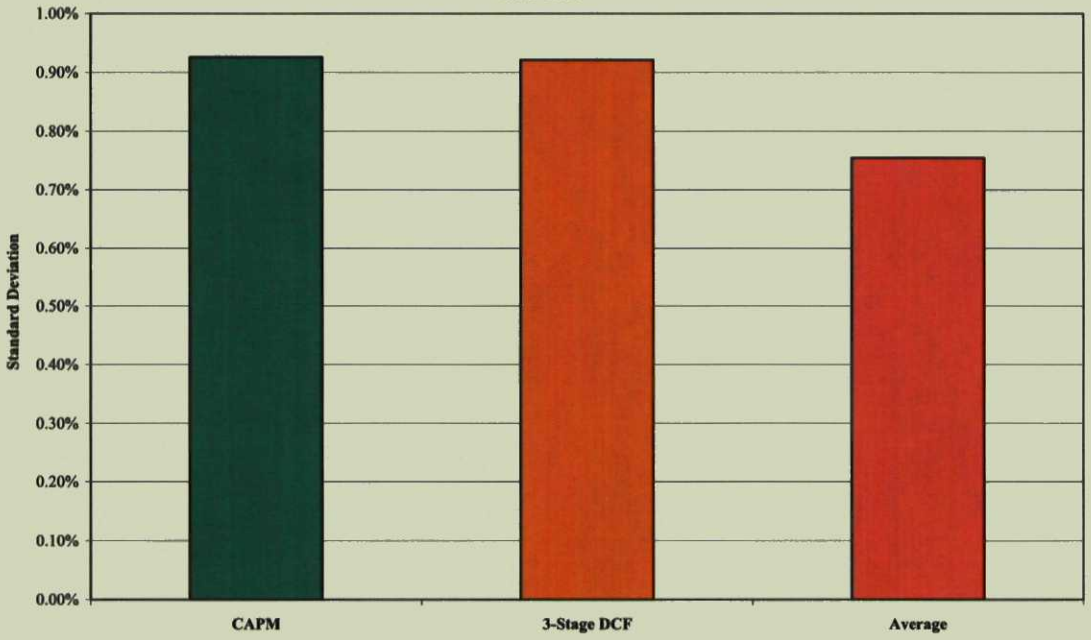
Exhibit 4
Three-Stage DCF and CAPM Estimates for Railroad Industry Composite
1998-2007



Source: Stangle workpapers, April 14, 2008

21. A common statistical measure of dispersion – the standard deviation of the estimate – confirms that taking the average creates a more stable estimate of the railroad industry's cost of equity. Exhibit 5 shows that the standard deviation of the CAPM estimates over the period 1998-2007 period is 93 basis points (0.93 percentage points), while the standard deviation of the three-stage DCF model estimates is 92 basis points. The average of the two estimates has a standard deviation of only 75 basis points over the same period. Thus, if the Board were to adopt the combination methodology demonstrated above it would produce a more stable estimate of the industry's cost of equity than if it were to rely on the CAPM methodology alone.

Exhibit 5
Standard Deviation of Cost of Equity Estimates
1998-2007



Source: Stangle workpapers, April 14, 2008.

22. The results in Exhibits 4 and 5 illustrate that a model with the basic features of the Morningstar/Ibbotson three-stage DCF model can be a useful complement to the Board's CAPM. The Morningstar/Ibbotson methodology is an independent third-party approach that has been applied to many different industries and the estimates are regularly relied upon by financial professionals. In my view, a DCF model with these basic features represents the best option for the Board to further improve its estimation of the railroad industry's cost of equity.

APPENDIX

The cost of equity for each firm (r_i) in the Morningstar/Ibbotson three-stage DCF model is the solution to the following equation [11]

$$MV_{i0} = \sum_{t=1}^{5} \frac{CF_{i0}(1+g_{i1})^t}{(1+r_i)^t} + \sum_{t=6}^{10} \frac{CF_{i5}(1+g_{i2})}{(1+r_i)^t} + \frac{\frac{IBEI_{i10}(1+g_{i3})}{r_i - g_{i3}}}{(1+r_i)^{10}}, \quad \text{(A1)}$$

where

MV_{i0} = market value of firm i in year 0 (i.e., the year for which the cost of equity is being estimated).

CF_{it} = average cash flow for firm i at the end of year t.

g_{ij} = earnings growth rate for firm i in stage j (j = 1, 2, or 3).

$IBEI_{10} = IBEI_0(1+g_1)^5(1+g_2)^5$.

Note that $IBEI_0$ is determined by the same process as CF_0 (see Exhibit 1)

The industry cost of equity (R) for the three-stage DCF model is computed as the market value weighted average of the individual firm cost of equity estimates:

$$R = \sum_{i=1}^{N} s_i r_i, \quad \text{(A2)}$$

where s_i is firm i's share of the total industry market value and N is the number of firms in the industry composite: $s_i = \frac{MV_{0i}}{\sum_{i=1}^{N} MV_{0i}}$.

[11] *Cost of Capital Yearbook*, 2007, Morningstar, Inc., p 24

VERIFICATION

I, Bruce E. Stangle, declare under penalty of perjury that the foregoing is true and correct.

Executed on April 14, 2008

Bruce E. Stangle

Bruce E. Stangle

CERTIFICATE OF SERVICE

I hereby certify that on this 14th day of April, 2008, I served by first class mail, postage prepaid, a copy of the foregoing on the parties listed in the official service list in Ex Parte No. 664.

Matthew Wolfe